

THE SNAKE AND ITS NATURAL FOES.

BY

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The position of the snake in the zoological world is a most unenviable one. How numerous are its enemies will be seen from the fact that it suffers destruction from almost the whole brute creation, beginning with the most exalted man, and passing down the animal scale to creatures as lowly as those included under the division *Insecta*. It would be hard, indeed, to say from whom it suffers the greatest persecution, but I will enumerate some of its enemies commencing with man, and proceeding down the animal scale.

CLASS—*Mammalia*.

Order.—*Primates*.—One of its most inveterate foes is undoubtedly man, who even in his most exalted state of civilisation learns almost from the cradle to recoil from its dreaded form, and who from the time that he acquires sufficient strength and courage unmercifully slaughters innocent and culpable alike.

Love of slaughter.—One finds abundant illustrations of civilised man's wanton brutality in books of sport, travel and adventure. Mr. E. O. Donovan is responsible for the following unabashed confession.* Speaking of the ruins of an old city near Marma Khan Tepé near the Mergab river which was infested with snakes, he says: "We spent half an hour hunting these up, and killing them with our whips, in consonance with the invariable Turcoman custom." Miss Hopley tells us† how a farmer in Wales at the end of one September was removing a heap of manure when he came upon a bed of snakes and slowworms. 352 were killed with thousands of eggs in clusters. From this motive alone—the love of slaughter—enormous numbers of snakes perish annually at the hands of civilised man. *Scientific motives*.—Again, civilised man from purely venial motives contributes to the yearly death-rate in his scientific researches in the departments of zoology, comparative anatomy, physiology, and toxicology, so that many hundreds of snakes annually reach our numerous laboratories and museums. The depreda-

* "The Merv Oasis," p. 269.

† "Snakes," p. 167.

tions, however, committed by civilised man are probably trifling in comparison with those wrought by the uncivilised and savage, many of whom display an even greater animosity towards these creatures and are brought into more constant and closer association with them.

Food.--As food, snakes are even at the present day consumed by some European nations, and many other people habitually eat and relish them. Speaking with Father John the Baptist recently in Mussoorie he informed me that to his certain knowledge many of the poor people in parts of Italy eat snakes, and consider them as attractive as eels, and vipers are said to be eaten by many people in the South of France.* In an interesting article in Cassell's Natural History† mention is made of a traveller in America who sat at table before a dish called "Musical Jack" which had been prepared by some travellers of another party under the same roof. It was prepared from rattlesnake, and was evidently considered by them a great delicacy. It was said to taste like chicken. Hartwig‡ too says that the American Indians often regale on the rattlesnake. Sir T. Mitchell in his book on Australia says he once tasted a boa constrictor himself, and describes it as "very like veal, the flesh being exceedingly white and firm." He also states that the Australian natives eat snakes, and Buckland says § "the flesh of snakes is not uncommonly eaten by the poor Bushmen, and also by the Australian natives."

The python especially seems to find favour as a tit-bit among many people. The Burmans relish it, as do also the Karens. Evans || speaking of a python which had been killed on one of his expeditions, says by the evening on his return he found it had been cooked by the Burmans. Theobald¶ remarks upon the Karens eating its flesh, and says that it looks white and tempting. A writer to *The Field* ** recording the capture of a python whilst incubating her eggs in Travancore, says that the hillmen there (Aryans) are reputed to feed on pythons and their eggs. The Chinese eat this snake in common with many other species, and I was told by a resident in Hongkong how on

* Museum of Natural History, Vol. II., p. 39.

† Vol. IV., p. 65.

‡ "The Tropical World," p. 316.

§ "Curiosities of Nat. Hist." First Series, p. 201.

|| Bomb. Nat. Hist., Journ., Vol. XVI., p. 519.

¶ Cat., Snakes, Brit. Burma, p. 37.

** Oct. 3rd, 1903.

one occasion when out shooting he encountered and shot a python on the mainland near that island. The Chinese who were with him cooked and made a sumptuous feast off it. Its name in the locality "Hoang Zo," meaning "Aromatic snake," must, I think, refer to the savoury smell its cooking flesh awakens in the Celestial's nostrils. F. in Thurn* speaking of the boa constrictor says that the Chinese alone of all the inhabitants eat and relish the flesh of these snakes. David Livingstone† says that the flesh of the python is much relished by the Bakalahari and Bushmen in Africa, and that when killed and cut up they carry away each his portion like "logs of wood over their shoulders." James Chapman‡ speaks of once having killed a boa in North Bechuanaland in which he found a hare, and remarks that the Bushmen with him not only ate the hare, but the snake as well. C. J. Anderson§ speaks of large snakes which inhabit the swamps about Lake Ugami, and says they are often destroyed by the natives, who devour them with relish. Colonel H. Yule|| under the word Anaconda, which he makes it appear is really the Ceylon name for the python, says: "It is added that the country people regard this great serpent as most desirable food."

Many other snakes enter into the dietary of various folk. Evans¶ tell us that the Karens eat the flesh of the hamadryad and pronounce it good. Phipson** again says he is informed that the Andamanese eat the hamadryad. In Bangalore I interviewed a man of the Tigala caste who told me his caste ate the Dhaman (*Zamenis mucosus*), but this appears to be the only snake they partake of. The head and a portion of the body anterior to the vent are removed, the snake skinned and cleaned, and then cut into pieces and cooked, and he compared the flesh to chicken in appearance and flavour. Richards†† mentions among other Indian castes the Santhals (who I find are supposed to be the indigenes of Chota Nagpur) and the Dhangars of the same locality as ophiophiles. The Kols, too (a tribe inhabiting the same part of India), according to Mervyn Smith,‡‡ include snakes in their bill of fare.

* Among the Indians of Guiana, p. 134.

† "Journeys and Researches," p. 145.

‡ "Chapman's Travels," p. 292.

§ "Lake Ugami," p. 452.

|| "Hobson Jobson," p. 16.

¶ Bomb. Nat. Hist. Journ., Vol. XIV., p. 417.

** Bomb. Nat. Hist. Journ., Vol. II., p. 245.

†† "Landmarks of Snake Poison Literature," p. 66.

‡‡ "Sport and Adventure in the Indian Jungle," p. 140.

I am told that the Kanjars, a wild race of people inhabiting Oudh and Rohilkhand, eat snakes, having decapitated and caudally amputated the body. Mr. Mackinnon tells me the tribe known as Myhras, who inhabit the Dun, devour snakes. David Livingstone* mentions a common watersnake yellow, spotted dark brown, of a harmless kind which the Bayeiye tribe in Africa ate and relished as food.

Cuvier† informs us that the seasnake *Pelamis bicolor* (*Hydruis platurus*) is eaten by the natives of Tahoite, and Cantor‡ speaking of the same snake, says it is used as an article of diet in New Guinea, the Molucca Islands, and Otaheite. Campbell§ speaking of the Andamanese credits them with including sea-snakes in their dietary. The same writer|| says that the Botocudos, Puris, and Caraodos, wild tribes inhabiting Western Brazil, eat snakes among many other animals, and again the same writer¶, speaking of the diet of the Californians, says they prefer reptiles, insects and vermin to mammals and birds, and mentions that they eat snakes with the exception of the rattlesnake.

Doubtless a whole host of other people conciliate their gustatory nerves by practising ophiophagy.

Medicine.—Another motive which is responsible for considerable diminution in their numbers is that arising from the medicinal virtues attributed variously to their flesh, organs, or secretions. Probably the mortality from this humane object is even superior to that incurred either by man's serpentivorous tastes, or love of butchery.

Vipers appear to have been especially valued for medicinal purposes in many parts of Europe even up to the recent past.

Both Pliny and Galen** praise the efficacy of viper flesh in the cure "of ulcers, elephantiasis, and other disorders arising from a corrupt state of the system. The flesh was served to the patient boiled like fish, as "being more efficacious than when taken in the form of powder, or other "dried state," and the account goes on to say that Sir Kenelm Digby's beautiful wife was fed on capons fattened with the flesh of vipers.

* "Journeys and Researches," p. 72.

† Encyclop. of Nat. Hist., Vol. III, p. 153.

‡ Journ. Asiat. Soc., Bengal, 1847, p. 1057.

§ Brit. Medl. Journal, Oct. 14th, 1905.

|| Brit. Medl. Journl., Sept. 16th, 1905.

¶ Brit. Medl. Journl., August 19th, 1905.

** "Encyclop. of Nat. Hist.," Vol. III, p. 1210.

Richards* tells us that "the flesh of vipers dressed as eels was strongly recommended by Galen as a remedy for elephantiasis (leprosy) * * *, and the physicians of Italy, and France very commonly prescribed the broth, and jelly of viper's flesh for the same uses. It appears also to have been given in England, for Mead observes the patient ought to eat frequently of viper-jelly, or rather as the ancient manner was to boil vipers, and eat them like fish; or if the food will not go down, though really very good, and delicious fare, to make use, at least, of wine in which dried vipers have been digested six or seven days in a gentle heat."

The Mead referred to was a celebrated physician who made many observations, and researches concerning snakes, and died as recently as 1754. The same writer further remarks that viper wine "was actually an acknowledged preparation in the London Pharmacopœia," and further that "Charles II's physician in ordinary, Dr. Thomas Sherley, recommended what he termed 'Balsam of Bats' as a remedy for hypochondria; it was composed of 'adders, bats, sucking-whelps, earthworms, hog's grease (sic), the marrow of a stag, and the thigh-bone of an ox."

Reint† speaks of the Japanese entrapping the poisonous *Trigonocephalus blomhoffii* which they skin, and consume as a nerve strengthening food. This is a very common little snake in Japan, and China, now known as *Ancistrodon blomhoffii*.

Duhakde‡ mentions a snake in the Honan Province of China speckled with white spots, the skin of which Chinese physicians steep in a vial of wine "which they make use of as a good remedy against the palsy."

When I was in Hongkong, I saw in the Chinese medicine men's shops rows of bottles on shelves containing snakes of many kinds preserved as in a museum. Steeping in the preservative were also fragments of vegetable substances—bark, leaves and fruit—and this horrible looking solution was decanted off as occasion required for the treatment of various ailments.

Richards§ remarks: "It is said that the flesh of the cobra was prescribed in Bengal for wasting diseases." Theobald|| speaks of the

* "Landmarks of Snake Poison Literature," p. 65.

† "Japan," p. 187.

‡ "China," Vol. 1, p. 102.

§ Loc. cit., p. 66.

|| "Catalogue of Snakes, Brit. Burma," p. 37.

Karens using the gall-bladder of the python for medicinal purposes, and that the flesh is eaten by them and “indeed looks white, and tempting.”

Carl Bock* makes mention of the Dyaks using the fat of the boa constrictor (*Python reticulatus?*) in ointments, and says they eagerly pursue the snake for this purpose. Anderson† has the following of the African race the Namaques :—“Many Namaques believe that the “ondara possesses certain medicinal virtues, therefore when they succeed “in killing the reptile” (probably from his description *Python natalensis*), “its flesh is carefully preserved. If a person falls sick, a portion “is either applied externally in the form of an unction, or given to the “patient in a decoction.”

In Chambers' Journal‡ a writer speaking of Brazilian snakes says, anent the rattlesnake (*Crotalus horridus*), “the fat of its entrails is “said to be a sovereign remedy for rheumatism,” and “the Museum of Natural History” § says that the fat of the Brazilian “Cucuriuba” (*Eunectes murinus*) is melted down and used for various purposes, as in rheumatic pains, sprains, etc. Only recently 2nd Grade Assistant Surgeon Har Prasad, an intelligent and well educated native, told me that he once had a case of insanity which he treated by the ordinary methods in vogue in English practice, but with no beneficial results for two months, at the expiry of which time the relatives begged him to allow a hakim to come in and adopt a native method of treatment. Acceding to their request this man administered cobra poison mixed with vegetable substances into a paste, which he smeared thickly all over the scalp, with the result that a speedy cure was effected.

Fayrer|| quotes the following on the authority of a learned Kabiráje, showing that cobra venom is extensively used by that caste as a therapeutic agent.

Physiological action.—“It is warm, irritant, stimulating, a promoter “of the virtues of other medicines, antispasmodic, digestive, a promoter “of the action of the secreting organs.”

Therapeutical action.—“Used in the later stage of low forms of fever “when other remedies fail, it accelerates the heart's action, and diffuses

* “The Head Hunters of Borneo,” p. 252.

† “Lake Ngami,” p. 300.

‡ Feb. 24, 1894.

§ Vol. II., p. 58.

|| “Thanatophidia,” p. 148.

“warmth over the general surface; clears the mind if coma supervene. In the collapsed state of cholera, it is successfully used. It is employed in dysentery, and some complicated diseases. Used in epilepsy arising from cold, relieving the patient from insensibility, and forgetfulness, symptomatic of that disease. Some practitioners have written that snake poison is used as an antidote in cases of snake-bite when the body is cold, and the heart’s action is scarcely perceptible. Used in such a state it accelerates the heart’s action, and causes a flow of blood to the distant capillaries in which circulation has ceased, and diffuses warmth over the general surface, etc.”

Young* gives the following curious recipe for snakebite which the Siamese physicians advocate:—“A piece of the jaw of a wild hog, a piece of the jaw of a tame hog, a piece of the bone of a goose, a piece of the bone of a peacock. The tail of a fish. The head of a poisonous snake.”

Mervyn Smith† alludes to the Chentsus, a tribe inhabiting the Nallamalley Mountains of India, skinning two hamadryads which he had shot, and remarks: “The poison fangs, and glands, the palate, and the gall were carefully preserved for medicine. Diluted with gingelly oil, the poison is drunk in small portions, and is said to be a wonderful preservative against all snakebites.”

An Antidote in Snakebite.—This belief in the efficacy of certain parts of poisonous snakes, and especially the poison as an antidote to snake-bite, is widespread. Mead, already referred to, had the greatest faith in viper’s fat as an antidote in viper bite, and claimed that it was the remedy used by the English viper-catchers from whom, after much trouble, he obtained the secret.

Among other “cordial remedies” which Richards‡ tells us were recommended was the “salt of vipers”, whatever this may mean. Many tribes habitually swallow snake poison with the idea of acquiring immunity from snake-bite, and there seems little reason to doubt that their belief is well founded as shown by experiment on the lower animals. The Revd. J. Campbell§ speaking of the Hottentots in S. Africa says they will “catch a serpent, squeeze out the poison from under li

* “The Kingdom of the Yellow Robe,” p. 124.

† “Sport and Adventure in the Indian Jungle,” p. 25.

‡ Loc. cit., p. 65.

§ Page 401.

tæth, and drink it." Fontana's viper-catcher, called Jacques, was reputed to swallow spoonfuls of viper venom.*

Fraser† mentions the following well authenticated reports of this practice with the avowed intention of acquiring a tolerance against snake poison. One Alfred Bolton set himself to enquire how the natives in Bushmanland, Namaqualand, Dumaraland, and Kalakari obtained immunity from snake-bite, and ascertained that they are in the habit of extracting the poison-gland of snakes, squeezing them into their mouths, and drinking the contents. Dr. Knobel, of Pretoria, substantiates this observation, and records having met a Bushman shepherd who said he had been in the habit for years of eating snake-venom.

Other people appear to inoculate themselves with the poison to attain the same object. M. D'Abdodie‡ says that the Vatnas of Mozambique inoculate themselves with snake poison to preserve immunity from snake-bite, and Calmette§ observes that a viper-catcher living in the Jura allowed himself to be bitten by vipers once or twice each year to preserve the tolerance he had acquired to their poison.

The Eisowy, a tribe inhabiting Western Barbary, says Drummond-Hay, allow themselves to be bitten by serpents proved to be venomous by a rapidly fatal experiment performed on a fowl and that, at the conclusion of an exhibition, the man commenced eating, or rather chewing, a poisonous snake which, writhing with pain, bit him in the neck and hands until it was actually destroyed by the Eisowy's teeth.

As an arrow dressing.—The poison of snakes is collected by certain savages for quite another purpose, *viz.*, that of dressing their arrows, and so dealing death to their foes or to wild beasts hunted for food; and though this does not necessarily imply the destruction of the snake, it is more than probable that where the quarry is a formidable one and shows fight there is little hesitation in killing the creature. The Scythians are reported to have poisoned their arrows with viper venom mixed with human blood. Livingstone|| speaking of the Bushmen in Africa says they poison their arrows with the piece of the *Euphorbia*

* Loc. cit., p. 75.

† "Nature," April 23rd, 1896, p. 595.

‡ "Academie des Sciences," Feb. 24th, 1896.

§ Bomb. Nat. Hist. Journ., Vol. XI, p. 521.

|| "Journeys and Researches," p. 171.

arborescens all over the country, and in some parts the venom of serpents is added to increase its virulence.

Mervyn Smith* says that the tiger slayers in Chota Nagpur poison their arrows with cobra-poison and set them in traps to be sprung. When wounded, the tigers go off and soon die, their movements being watched by the hunters. Sims Woodhead commenting upon a paper which appeared recently by Chalmerst on the poison used by the Fra Fras, a tribe inhabiting, I believe, Uganda, says: "There appears to me to be a probability that the venom is extracted from the heads of snake before they are boiled with the powdered seeds and that this venom may be added to the vegetable poison smeared on the arrow after it has cooled."

Trade purposes.—Snakes are captured by many people in some numbers for show purposes, and though the destruction so caused may not amount to much, the captured snakes often speedily emaciate and die, requiring the substitution of others. Indian jugglers always have a few in their stock-in-trade, and are always ready to let the mongoose that accompanies them worry them to death for a few annas.

In addition, they are sometimes called in to rid some infested place of snakes, and doubtless do in some cases justify their errand. The Psylli of Africa appear to perform a similar office. Figurier‡ speaks of these people, and from his description they appear to be a caste of Egyptians, since he says the arts they practise are inherited, and he expressly states that outsiders who seek to become one of the fraternity fail to acquire their arts. They are to be seen in Cairo and Alexandria, and live by exhibiting snakes. They sometimes appear in processions, and carry capacious bags in which their snakes are secreted. These they take out and allow to entwine about their persons, and, in order to excite popular feeling, even cause them to bite their bodies. They claim to have acquired ascendancy over even poisonous snakes, for they include the Egyptian cobra (*Naia haje*) in their stock-in-trade. They also claim to be able to induce snakes to leave their natural haunts, and then catch them, so that when a house becomes infested with these creatures, the Egyptians frequently send

* "Sport and Adventure in the Indian Jungle," p. 104.

† Royal Army Medical Corps Journal, August 1905.

‡ "The Life and Habits of Animals," p. 35.

for these people to rid the premises of these undesirable guests. The Marsi of Italy are reputed to be immune to snake poison, and, I believe, practise somewhat similar arts; but I can find no authentic description of these people to enlighten me on their habits.

In the arts.—Many people question the use of snakes in the animal world, and they may be surprised to learn that some at least are of use for trade purposes other than the barter to which they are subjected for show purposes. Wells* in relating an interesting experience of his shows that the skin of the anaconda (*Eunectes murinus*) is used in Espirito Santo for making riding boots, and he speaks of going to a bootmaker's shop† on one occasion and finding the skin of a snake from which pieces had been cut at each end for the manufacture of boots. The remnant measured 19 feet, and he was told the entire skin measured 25 feet. Colonel Yule‡ also mentions this snake under the names "Sucuriu," "Sucuriuba," and scientifically as *Boa anaconda*, and says its skin is used for boots, shoes, and other purposes. "The Museum of Natural History" mentions the skin of the same snake being used for shoes, portmanteaux, etc. (p. 58).

Order.—Carnivora.—*Family.*—Felidæ.—Instances of the Carnivora feeding upon snakes are by no means uncommon. Even His Royal Highness the Indian tiger is evidently not disdainful of such fare when occasion offers, for Inverarity§ records a remarkable illustration of this in the following words:—"On opening the stomach of an old tigress I shot last month, I found in it the tail end of a snake that the tigress had bitten off and swallowed whole; the portion swallowed measured 2 feet 3 inches in length * * * It appeared to me to be a rock snake."

A specimen of the fishing cat (*Felis viverrina*) which Hodgson had brought to him proved on investigation to have eaten a large snake.

That cats in a domesticated state kill snakes is very well known, and not long since some interest was aroused on this topic in the columns of "The Field."|| Besides the many examples quoted therein, I can add others. A friend of mine, Mr. Sitwell, told me he once saw a cobra at Bankipore dying after being mauled by a cat. The cat was still pawing it when he came on the scene, and he was told by others

* "Three Thousand Miles through Brazil," p. 167.

† Loc. Cit., p. 171.

‡ 18th and 25th June, 9th July and 18th August 1904.

§ "The Great Thirst Land," p. 147.

|| "Hobson Jobson," p. 16.

present had reduced it to this dying condition. Parker Gillmore* refers to a cat in South Africa which he saw kill a snake which had entered the drawing-room, having commenced operations by seizing it by the head.

Family.—Viverridæ.—Among the Carnivora probably no creatures commit such wholesale slaughter of snakes as the mungoose (*Herpestes*), but whether all of the many species exhibit the same partiality towards this flesh I am not able to say. I was lately informed on good authority of a company of mungoose which was busily engaged in hunting on a railway cutting which gave exceptional scope and opportunity for observation. They instituted a systematic search in the grass, and apparently for snakes. One at any rate was flushed and promptly captured, and the little gang having collected tore it in pieces, and ate the fragments, and immediately dispersed to renew their hunting. The general behaviour of the party as described to me suggested a family being instructed by their parents. Blanford† describes these little animals as “deadly enemies to snakes”, and almost every writer on Natural History gives ample evidence of the ravages they commit in the snake world.

Family.—Canidæ.—Dogs at any rate in a domesticated state are occasionally known to develop ophidioclastic tendencies, and, this being so, it is more than likely that their feral allies exhibit similar habits, though I am not aware of any authentic instance. I have in my note-book a cutting from a paper I took some time ago, omitting at the time to note the paper and its date, but it was about ten years since. This gives a very interesting account of a dog which was in the habit of killing snakes, and with it was a reproduction from a photograph of the dog standing over one of his dead victims. It was the property of a Mr. J. Smith, of Nhill, Victoria, Australia, and the account says it had killed about 35 snakes in one summer. It eventually succumbed to bites inflicted by a poisonous species with which it engaged in mortal combat. Bryden‡ mentions a dog taking up a green tree snake in his mouth and running off with it. Colonel Yule§ records a bull-dog in the possession of a Staff-Sergeant at Delhi that used to catch cobras.

* Bombay Nat. Hist. Soc. Journ., Vol. VII, p. 405.

† Fauna, Brit. India Mammalia, p. 121.

‡ “Gun and Camera in South Africa,” p. 80.

§ “Holson Jobson,” p. 178.

Family—Mustelidæ.—Blanford* includes snakes in the dietary of the beech martin (*Mustela foinæ*), and Miss Hopley† includes the weasel and the badger in her list of serpentivores.

Order—Insectivoræ.—There are even instances of these quiet little animals preying on snakes, for Buckland tells us that he demonstrated by direct experiment that his pet hedgehog would eat the grass-snake of Britain, and Miss Hopley† also mentions the hedgehog in her list of animals that devour snakes.

Order—Rodentia.—It seems difficult to believe that rats, and even mice, occasionally attack and kill snakes, but such is undoubtedly the fact. Miss Hopley† mentions the rat as one of those that will kill snakes, and I have on very good authority the following remarkable testimony of murine ferocity directed against these reptiles. Assistant Surgeon Robertson narrated to me how he once put a rat into one of his snake cages as food for a large ratsnake (*Zamenis mucosus*). The rat, however, when brought to bay defended itself with great courage and determination, and fought with its would-be master to such purpose that “the snake it was that died.” Its tactics consisted in its fixing itself on the back of the reptile’s neck, and, having once obtained the mastery, its ferocity and courage were stimulated to such a degree that it fought and killed several other snakes caged with it. Considering it had earned its liberty, it was finally released. The Revd. G. H. R. Fisk‡ tells an even more remarkable story. He had two young ringhals (a poisonous S. African snake, *Sepedon hæmachates*), one 10 inches long, the other 9 in a box. A mouse was put in for them to eat, but when the box was next opened, the rodent was found to be eating one ringhal, and subsequent observation proved that the mouse made an onslaught on the other by fastening itself by its claws on to the snake’s back, and then “pecking” it with its teeth. It was dragged round and round the box by the snake in its endeavours to free itself, but managed to elude the snake’s repeated attempts to strike it.

Order—Ungulata.—*Family*—Cervidæ.—Deer are reputed to kill snakes by jumping upon them. Tennant§ mentions this on the authority of the natives of Ceylon.

* Fauna, Brit. India Mammalia, p. 161.

† “Snakes,” p. 57.

‡ Proc. Zool. Soc., London, 1887, p. 340.

§ Nat. Hist. of Ceylon, p. 295.

Family—Bovidæ.—Miss Hopley* includes goats among animals known to destroy snakes, and it is significant that the word “markhor” means “snake-eater” in Persian. Whether this noble beast has been observed to eat snakes I cannot say, but the *Encyclopædia of India* alludes to this as a fable which is probably the case, the mountain tribes believing that they can kill snakes by looking at them!

Family—Suidæ.—There is abundant evidence to prove that pigs are among the most inveterate foes that snakes have to encounter. Parker Gillmore† speaking of South Indiana and Illinois says that rattlesnakes used to be very plentiful there. “Their destruction was principally accomplished by the introduction of hogs which greedily feed upon these reptiles whenever chance throws them in their way. I have several times had opportunities of watching a pig in an encounter with one of these snakes which they worry as a clever terrier would a rat. The hog attacks the rattlesnake with such energy, and rapidity that the assailed reptile has scarcely time to guard himself against the attack when he finds himself in the fatal grasp of his too powerful foe.”

Hartwig‡ again says the chief enemy of the rattlesnake is the hog, and Simson§ remarks that he has seen pigs catch and eat snakes

Apropos this porcine habit “The *Cyclopædia of India*”|| has the following, speaking of the Negro ophiolatry in the kingdom of Whidah in Africa:—“The hog especially, which preys particularly upon several species of these reptiles (snakes), and which is well known to attack with impunity the most venomous of them, is pursued in the Kingdom of Whidah as a public enemy; the Negroes seeing only in this valuable animal an enemy which devours their god.” Miss Hopley¶ mentions the peccary among known destroyers of these reptiles.

CLASS—*Aves*.

The list of birds which are known to practise ophiophagy is a very large one, and many of these, especially the larger raptorial species, must inflict a very heavy mortality among the anguine population.

* “Snakes,” p. 57.

† “Prairie Forms and Prairie Folk,” p. 156.

‡ “The Tropical World,” p. 316.

§ Letters on Sport in Eastern Bengal, p. 341.

|| Vol. V, p. 56.

¶ “Snakes,” p. 57.

Order—Passeres.—*Family*—Corvidæ.—Mr. Fitzgerald told me recently that he had once seen the tree pie (*Dendrocitta rufa*), or as he called it the “Bobbalink,” killing a snake which probably from his description was a *Tropidonotus stolatus*.

Order—Anisodactyli. *Sub-order*—Coraciæ.—I have three records of the common roller, or blue jay (*Coracias indica*), killing and eating these reptiles. Grieves,* commenting on a paper on this bird which was contributed by D. D., says: “Cycling along a jungle path one day my attention was attracted to one of these birds which was making a great fuss and noise close to the track along which I was to pass. I dismounted, and was fortunate enough to see a great battle in progress between a blue jay and a small cobra. The latter was about 15 inches long, but it was certainly on its defence, and the blue jay was the attacking party. The cobra was trying to get under cover, but at every move the blue jay attacked it most ferociously, apparently with both beak and claws. Then the cobra would rear its head, expand its hood, and dart at the enemy. The blue jay did not flinch, but at the same moment flicked out its wing horizontally, and off the cobra started again, only to be teased, and tormented. I had been watching this battle for fully five minutes when my dog, which had been roaming about the jungle, rushed up to the spot, and scared away the jay. The second incident occurred in my own compound just a few weeks after the event referred to above. Out in the compound one morning I saw a jay sitting on a low branch of one of the trees struggling with something in its beak. On drawing near I saw that the something was about 8 or 9 inches of snake. The head had already disappeared, so that I cannot say how long the snake might have been, or of what kind.”

On the 12th April last year (1905) Mr. Hose, the Deputy Commissioner in Fyzabad, told me he had that morning seen a roller in his compound in the act of swallowing a small snake, and mentioned it as a remarkable incident.

Sub-order—Halcyones.—A writer to *The Field* (June 25th, 1904) besides mentioning two cats of his in Queensland that were in the habit of killing snakes says: “But what surprised me still more was to see the laughing jackass or great kingfisher of Australia carry a snake

* “The Madras Mail,” 17th September 1904.

to a great elevation, and then drop it on to the hard ground, rendering it helpless."

Order—Striges.—Blanford* tells us that the rock horned owl (*Bubo bengalensis*) lives on rats, mice, birds, lizards, and snakes, and what is true of this owl is in all probability true of many others.

Order—Accipitres.—*Sub-family*—Gypogeranidæ.—Many species of this order include snakes in their dietary. The Secretary bird (*Serpentarius reptilivorous*) is, I believe, included in the order, and has a world-renowned reputation for destroying these creatures. It is said to disable them by blows from its wings and feet, and is also reported to carry them aloft, and kill them by dropping them. Le Vaillant, who once killed one, found, on investigating its crop, that it had eaten "eleven rather large lizards, three serpents of an arm's length, and eleven small tortoises, besides a number of locusts, beetles, and other insects."

Sub-family—Falconinæ.—Among Indian birds of this sub-family that are known to evince serpentivorous tastes are, according to Blanford,† the Indian tawny eagle (*Aquila vindhiana*), the short-toed eagle (*Circaetus gallicus*), the crested serpent eagle (*Spilornis cheela*), Pallas's fishing eagle (*Haliaëtus leucoryphus*), the white-bellied sea eagle (*Haliaëtus leucogaster*), the rufous winged buzzard eagle (*Bustard liventer*), the pied harrier (*Circus melanoleucus*), Fielden's hawk (*Poliobierax insignis*). Mr. Mackinnon recently told me that on one occasion he saw a *Circaëtus gallicus* descend into some long grass where it remained some time. Out of curiosity he walked it up, and shot it as it rose. On opening its crop he found 7 snakes, one still alive. They were all of the same species (one of the genus *psammophis*). Aitken‡ says of the sea eagle (*Haliaëtus leucogaster*) that it lives chiefly on sea serpents, and Cantor§ remarks that in two of this species shot in the Gangetic Delta he found remains of sea serpents.

Kites are known to eat snakes at times. I have myself seen the common pariah kite (*Milvus govinda*) stoop into a marsh, and rise with a snake wriggling in its talons, and it is probably this species that

* Fauna, Brit. Ind.: Aves, Vol. III, p. 286.

† Fauna, Brit. Ind.: Aves, Vol. III.

‡ "The Common Birds of Bombay," p. 26.

§ Trans. Zool. Soc., London, 1840, p. 508.

Ferguson alludes to going off with a snake.* Swaysland† also attributes anguine tastes to the kite. The Brahminy kite (*Haliastur indus*), according to an article in the Cyclopædia of India,‡ is credited with a similar habit, for it says: "In the South of India, the accepted type of Garuda is the common Brahminy kite * * * This bird pounces upon, and carries off the cobra in its claws, and kills it." Aitken§ has a picture of a harrier descending upon a snake. It is no uncommon event for sportsmen in this country to witness eagles, kites, and other predaceous birds descend into the jheel, or marsh, and bear away a snake wriggling in their grasp.

Order—Ratitæ.—Hartwig|| ascribes serpentinivorous habits to the "American ostriches" or rheas.

Order—Gallinæ.—The galline birds, like the accipitrine, contribute very largely to the decimation of these limbless vertebrates. The peafowl (*Pavo cristatus*) is well known to show a partiality to this fare, and in Ceylon I have known people keep tame peafowls with the idea of keeping their premises free from snakes. Bennett, who lived in the south-eastern part of that Island, ascribed the paucity of snakes in the jungle to the abundance of the peafowl whose partiality to snakes, he says, renders them the chief destroyers of these reptiles. Hume and Marshall¶ record the cook on one occasion removing a small snake about 8 inches long from the stomach of one of these birds.

Tennent** says that snakes are frequently eaten by the common barn door fowl in Ceylon, and opines, that the jungle species behave similarly. Drieberg†† mentions having observed a pullet on one occasion in Ceylon (Gokarella) pursuing a snake 12 to 15 inches long, which it killed and swallowed, and though a novel experience to him he ascertained from the resthouse-keeper and others that it is a common event, and that the village poultry, as a rule, attack and make a meal of them. Mr. P. Mackinnon told me recently that on one occasion in

* Bom. Nat. Hist. Soc. Jour., Vol. X, p. 1.

† "Familiar Wild Birds," p. 111.

‡ Vol. V, p. 229.

§ "The Common Birds of Bombay," p. 15.

|| "The Tropical World," p. 321.

¶ "Game Birds of India, Burmah and Ceylon," p. 87.

** Nat. Hist. of Ceylon, p. 295.

†† Spolia Zeylanica, Vol. III, p. 202.

the Dun when sitting in a verandah he saw a small cobra close beside him, which he rose to despatch when he saw a white fowl running towards it. The fowl attacked vigourously, caught it by the back, and repeatedly pecked it; subsequently, it swallowed it with no ill-effects. What is true of the domesticated breed is probably and equally true of the jungle species; indeed, Gunther* remarks that the jungle fowl preys on young cobras.

Order—Grallæ.—*Family*—Otididæ. The great Indian Bustard (*Eupodotis edwardsii*) is a serpentivore according to the authority of Hume and Marshall†, who also give similar evidence against the Bengal florican‡ (*Sypheotis bengalensis*).

Order—Limicolæ.—Webber§ is responsible for the following incident which shows that the red-wattled plover (*Lobivanellus indicus*) will put up a good fight against a snake, though in this instance the reptile was not killed. He says: "One day when riding an elephant I discovered how useful the spur was. I saw one of these birds engaged in mortal combat with a snake which was trying to rob her nest * * The bird got the best of the battle, inflicting some sharp blows on the serpent, which retired discomfited."

Order—Herodiones. *Family*—Ibididæ. I can find no recent evidence to show that the Ibis is an ophiophage, but Juvenal,|| speaking of an Egyptian species, makes no doubt of it in his lines—

"Who has not heard where Egypt's realms are nam'd
 "What monster gods her frantic sons have fram'd?
 "Here Ibis gorg'd with well-grown serpents, there
 "The crocodile commands religious fear," etc.

Family—Ciconidæ.—Hartwig¶ credits the Adjutant (*Leptoptilus dubius*) with anguine tastes, and Ferguson** remarks that, in the public gardens at Trivandrum, water snakes used frequently to come into the cages of the waterfowl to devour the fish with which they were provided for food and that they were often killed by the herons, but the hair-crested stork (*Leptoptilus javanicus*) took a special

* Reptiles of Brit. India, p. 354.

† Loc. cit., p. 9.

‡ Loc. cit., p. 25.

§ "The Forests of Upper India," p. 211.

|| Satire, XV.

¶ "The Tropical World," p. 322.

** Bombay Nat. Hist. Jour., Vol. X., p. 5.

delight in watching for and killing them. The white-necked stork (*Dissura episcopus*) has similar tastes, for two English boys recently told me that they once saw their cook, when cleaning a "beefsteak" bird for the table, remove a snake from its crop.

Family—Ardeidæ.—Aitken* reports having seen the little egret (*Herodias garzetta*) trying to swallow a snake, and Ferguson, just quoted, makes reference to herons exhibiting similar tastes.

CLASS—*Reptilia*.

We come now to another large class which numbers in its ranks several whose partiality to a serpentine diet is well known.

Order—Squamata.—*Sub-order*—*Lacertilia*.—Though lizards, like frogs, constitute the snake's especial perquisite in the zoological market, the tables are sometimes turned, and the larger lizards will assert their supremacy and practise ophiophagy, and, as will be seen later, instances have been known where the frog, handicapped though it is in weapons of offence, has been known to pay back some of the scores against its own kind by developing serpentivorous habits. I have collected the following instances of lizards dominating snakes. Mr. Gleadow† tells me he once saw a varan or monitor lizard running off with a live snake, 3 or 4 feet long, in its mouth, which it released on seeing him. He shot the snake, which proved to be a cobra. Dalrymple‡ records a big iguana in S. Australia doing battle royal with a whipsnake. The Revd. J. H. R. Fisk§ mentions a lizard in South Africa attacking and killing a snake, and in the "Museum of Natural History"|| the following appears:—"The Ammodyte, according to the testimony of M. Host, appears to be a nocturnal species of serpent, and commits great havoc amongst field mice, small birds, and many lizards. It falls a prey itself, however, to one of that tribe of animals. The Scheltopusik (*Pseudopus pallasii*) is one of its most redoubtable and bloody enemies. Shielded by its cuirass of tilelike, hard scales, it is proof against the fangs of the viper, attacks it with impunity, and devours it at leisure."

Sub-order—*Ophidiæ*.—Snakes, and especially certain species, are well known to prey upon one another, and make no hesitation in commit-

* The Common Birds of Bombay, p. 181.

† "In Epistola."

‡ "The Field," June 25th, 1904.

§ "Proc. Zool. Soc., London, 1883, p. 32.

|| Vol. II., p. 48

ting cannibalism. The Hamadryad (*Naia bungarus*) has a particularly evil reputation, feeding as it does, almost exclusively, upon snakes; and if its voracity in its native haunts approaches that during captivity, the death-roll from this single species must be very considerable, for Miss Hopley* informs us that one specimen in the London Zoo disposed of as many as 82 snakes in one winter, and a writer to "The Field" (April 16th, 1904) says that a specimen, 8½ feet long (by no means a large one), in the Trivandrum gardens consumed as many as 44 rat-snakes in one year. It is certainly notable that in the majority of instances on record where this snake has been killed, it has been found to have lately fed, and hazarding a guess I think I am well within the mark when I say of all other snakes which are brought to me not more than one in ten contains anything "in gastro." The kraits do not exhibit so voracious an appetite, but those that are killed that have dined give abundant proof of their partiality to the flesh of their own brethren. Many other snakes in a state of captivity prey upon one another, but I do not think that this argues that they would do so in their natural state; and I am inclined to believe that with the majority it is only when hunger presses sorely, that they devour one another. I have collected all the instances I can find where ophiophagy has been perpetrated in a state of nature among our Indian representatives, which I append in tabular form.

Victor.	Victim.	Authority.	Reference.
<i>Naia bungarus</i> ...	<i>Bungarus fasciatus</i> .	Primrose ...	Bomb. Nat. Hist. Journl., Vol. XII, p. 589.
Do. ...	<i>Naia bungarus</i> ...	Evans ...	Bomb. Nat. Hist. Journl., Vol. XIV, p. 416.
Do. ...	<i>Naia tripudians</i>	Evans ...	Bomb. Nat. Hist. Journl., Vol. XIV, p. 416.
Do. ...	Do. ...	Craddock ...	Bomb. Nat. Hist. Journl., Vol. XIV, p. 143.
Do. ...	<i>Python molurus</i> ?	Aitken ...	Bomb. Nat. Hist. Journl., Vol. XIV, p. 629.
Do. ...	Do. ...	Mervyn Smith	Sport and Adventure in the Indian Jungle, p. 19.
Do. ...	Not specified	Branson ...	"The Pioneer," 4th Sep. 96.
<i>Naia tripudians</i> ...	<i>Dipsadomorphus trigonata</i> .	Wall ...	Bomb. Nat. Hist. Journl., Vol. XV, p. 524.
Do. ...	<i>Macropis thodon rhodomelas</i> .	Flower ...	Proc. Zool. Soc. Lond., 1896, p. 894.
Do. ...	<i>Zamenis mucosus</i> ?	Kinloch ...	"In Epistola."

* "Snakes," p. 566.

Victor.	Victim.	Authorly.	Reference.
<i>Bungarus fasciatus</i>	<i>Tropidonotus piscator.</i>	Evans ...	Bomb. Nat. Hist. Journl., Vol. XIV, p. 599.
Do. ...	<i>Not specified</i> ...	Simson ...	Letters on Sport in Eastern Bengal, p. 246.
Do. ...	Do. ...	Primrose ...	Bomb. Nat. Hist. Journl., Vol. XII, p. 589.
Do. ...	<i>Tropidonotus</i> ...	Theobald ...	Cat. Snakes, Ind. Mus., p. 73.
<i>Bungarus candidus</i>	<i>Lycodon aulicus</i> ..	Wall ...	Bombay Nat. Hist. Journl., Vol. XV, p. 706.
Do. ...	<i>Zamenis mucosus</i> ..	Phipson ...	Bombay Nat. Hist. Journl., Vol. IX, p. 499.
Do. ...	<i>Dipsadomor phus gokool.</i>	Trall ...	Bombay Nat. Hist. Journl., Vol. IX, p. 499.
Do. ...	<i>Zamenis mucosus.</i>	Ferguson ...	Bombay Nat. Hist. Journl., Vol. X, p. 7.
<i>Bungarus sindanus</i>	<i>Echis carinata</i> ...	Boulenger ...	Bombay Nat. Hist. Journl., Vol. XI, p. 74.
Do. <i>ceylonicus</i>	<i>Vropeltides</i> sp. ...	Günther ...	Rept. Brit. Ind., 1863, p. 344.
<i>Zamenis mucosus</i> ...	<i>Zamenis mucosus</i>	Robertson ...	"In Conversatione."
Do. ...	<i>Chrysopelena ornata.</i>	Flower ...	Proc. Zool. Soc., London, 1899, p. 684.
Do. ...	<i>Psammophis condanarus.</i>	Lightfoot ...	Bomb. Nat. Hist. Journl., Vol. XV, p. 347.
Do. ...	<i>Rhinophis</i> sp. ...	Green ...	"In Epistola."
<i>Xenopeltis unicolor</i>	<i>Zamenis mucosus</i> ...	Theobald ..	Journl. Asiat. Soc., Bengal, 1868, p. 37.
Do. ...	<i>Tropidonotus stollatus.</i>	Evans & Wall	Bomb. Nat. Hist. Journl., Vol. XIII, p. 352.
Genus <i>Callophis</i> ...	<i>Calamariæ</i> ...	Günther ...	Rept. Brit. Ind. 1863, p. 347.
<i>Python molurus</i> ...	<i>Naja bungarus</i> ..	Donaghy ...	"In Conversatione."
<i>Ancistrodon hypnale.</i>	<i>Aspidura trachyprocta.</i>	Wall ...	Spoliæ Zeylonica, Vol. III, p. 147.
<i>Driophis mycterizans.</i>	<i>Tropidonotus stollatus.</i>	Primrose ...	Bomb. Nat. Hist. Journl., Vol. XV, p. 347.
<i>Dendrophis dendrophilus.</i>	<i>Chrysopelena ornata.</i>	Flower ...	Proc. Zool. Soc., London, 1899, p. 680.
<i>Psammophis condanarus.</i>	<i>Echis carinata</i> ..	Jerdon ...	Journl. Asiat. Soc., Bengal, Vol. XXII, p. 529.

Class Batrachia.

Order—Ecaudata.—It is certainly a remarkable thing for creatures so defenceless as the frogs, to attack and actually overcome animals as well equipped for offence as snakes, but that this occasionally happens must be admitted on so excellent an authority as Mr. E. H. Aitken. He mentions an instance* he witnessed of a bull-frog (*Rana tigrina*) in this country attempting to swallow a snake about 2 feet long, but the struggles of the ophidian proved so violent that the batrachian fell into an adjoining tank, and the end of the encounter was lost to

* Bomb. Nat. Hist. Jour., Vol. IX., p. 500.

view, and to history. This episode does not stand alone, for Symonds* speaks of a bull-frog he once found with a dead snake, *Psammodphis crucifer*, (South African) 18½ inches long in its mouth and remarks that the natural food of this snake is frogs!

Phyla Arthropoda.

Order—Arachnida.—Coming still further down the animal scale we arrive at the arthropods, and I have two instances of centipedes attacking snakes, both already recorded in this Journal.† In Mr. Okeden's case an excellent photograph shows the centipede (*Scolopendra*) in the act of gnawing at the caudal extremity of the snake, which appears to be twice the length of its devourer. In Mr. Cumming's case the centipede boxed with a *Zamenis ventrimaculatus*, attacked it under provocation from its owner, and bit so malignantly that the reptile shortly died.

Class Pisces.

Order—Selachoides.—Cantor‡ remarks that from M. Peron's observations, sharks appear to be the natural enemies of the marine serpents.

Division Insecta.

Order—Hymenoptera.—One reads in Natural History books of the famous driver ants of South America which manœuvre through jungles in military fashion, and attack and destroy all animal life that they encounter, even to creatures of the magnitude of the largest boas. Its humble eastern allies though not employing such methodical tactics, nor acting on so extensive a scale, do occasionally attack and overpower living animals including snakes. A very pretty little green keelback (*Macropisthodon plumbicolor*) I had in captivity was attacked, and reduced to a skeleton one night by ants. Ferguson§ records a similar experience, for which ants (*Solenopsis geminata*) were responsible, their victim, a *Helicops schistosus*, being literally skeletonised.

When I began these remarks I had no idea the list of natural foes to the snake would present so formidable an array, and provide material for so voluminous a paper, but I feel sure that this list, long as it is, could be very considerably supplemented by many of our readers.

* Proc. Zool. Soc., London, 1887, p. 467.

† Vol. XV., pp. 135 and 365.

‡ Trans. Zool. Soc., London, 1840, p. 308.

§ Bomb. Nat. Hist. Jour., Vol. X, p. 6.

SOME HINTS FOR BEGINNERS ON COLLECTING AND
PRESERVING NATURAL HISTORY SPECIMENS.

BY E. COMBER, F.Z.S.

(Continued from page 650 of Vol. XIII.)

PART IV.

Note.—In recommencing this series of papers after so long an interval as five years, I feel that a word of apology is perhaps appropriate. In the first place circumstances intervened which prevented me from being able to spare the requisite time for the preparation of the subsequent parts, and in the second place I felt that so little response had been forthcoming in the way of specimens contributed to our collections, except of course of bird skins, of which we have a number of careful and enthusiastic collectors, that it seemed hardly worth while continuing the series on the last section of the vertebrates (Fishes) and on the several groups of invertebrate animals, which apparently, with the single exception of the Insects, fail to arouse any degree of enthusiasm amongst the present younger generation of our members. However it has been urged on me that the papers were perhaps more generally appreciated than I imagined, and that a few practical notes on the way to set about collecting and preserving the lower animals might at any rate induce a few beginners to try their hands at the job. If the results justify this hope, I shall be more than satisfied.

It is amongst the lower forms of animal life that the way is open to any one, who will take a little trouble, to do a vast amount of really original and useful work, not only in the way of bringing previously unknown, or unrecognised, forms to the notice of naturalists, but of studying and noting the habits and life histories of species already described from their fully developed forms. It is in this latter connection that the true spirit of the field naturalist comes out, as distinguished from the mere collector or museum expert, and I wish again to strongly impress upon the beginner the invaluable assistance of the note book, which is too often ignored. The apparent insignificance of notes at the time should never be allowed to deter a collector from entering them in black and white in his note book, and even the roughest of sketches will often help to recall details that would otherwise be forgotten in a short time if merely entrusted to memory. In years to come it will be found quite surprising how interesting these rough notes become, and how